REMARKS

In the Office Action dated May 6, , 2004, claims 11-18, 20- 28 and 30 are pending and all claims are rejected. Reconsideration is requested for at least the reasons discussed hereinbelow.

Objection is made to the application under 35 U.S.C.§132 because it allegedly introduces new matter. Applicants strogly disagree.

The present application is a 371 application entering the national phase of PCT/DE00/018888. The PCT application was published as WO 01/00351 A1. The abstract of the PCT publication was translated by the international authority at WIPO, which states:

> **Abstract:** The invention relates to a simple shaft tool tha[t] can be produced in an easy and economical manner. Said tool comprises fixedly disposed winglike inserts for milling-type machining of non-chip forming materials and remains operationa during unavoidable abrasive wear and increased wear and tear. According to the invention, the shaft tool is characterized by a shaft (1) that can rotate aout its longitudinal axis (2). ***Said tool*** can be releasably connected to a drive device and ***is fitted with*** at least one groove-like recess (7) extending in the radial direction and ***a flat cutting blade (8)*** on the free end segment of the tool, ***said blade being provided on the front side with a non-cutting edge (12)*** when viewed from the direction of displacement. The shaft tool is used in the production of molds, more particularly heat-resistant casting molds for manufacturing of cast parts made of metal.

[Emphasis added; see Attachment 1]. The PCT application is the original disclosure. Its disclosure provides the basis for claims in the 371 application.

Applicants prior reference to support in the original German Application was a reference to the PCT International Application filed in the German language.

Applicants' attorney apologizes for any confusion as to the source of support for the amendment to the specification.

In any event, it can be seen that the original specification was summarized in English in the WIPO publication of the original internatioanl application. It cannot be denied that the invention in the internatioanl application is directed to a shaft tool with **a flat cutting blade (8) having a non-cutting edge (12)**. Thus, **a non-cutting edge** for the tool of the present invention is **not** new matter.

The PCT international application designating the United States is in the German language. The original translation states:

> The cutter blade 8 can be produced as a punched part by punching from a flat blank of sheet metal or wear-resistant sheet metal, with the invention not being limited to the mentioned examples of embodiment. Instead, unmentioned suitable materials and semifinished products can also be used, if they are within the scope of the patent claims. In particular, this is true for composite materials, fiber composition materials, or high-strength materials or ceramic or fiber-composite ceramic elements.
>
> The cutter blade 8 according to Figure 1 is provided with a non-cutting blade edge 12 on the leading flat side 11 viewed in the direction of advance 9, at a right angle to the flat side 11 when a simple punched part is used. In this case the blade thickness can be comparatively small.
>
> The blade thickness can be 0.1 mm - 5.00 mm. The blade thickness is preferably 0.2 - 1.00 mm.
>
> In particular, the blade thickness should be no greater so that the

tangential angle of the flank of the leading blade edge 12 is close to or equal to zero.

See page 5, lines 10-21.

Thus, it is seen that the original translation teaches cutting blade 8 with a non-cutting blade edge 12.

A translation of the original PCT international application (which was made for the corresponding European patent application, now granted) confirms the original translation on this point. See copy of translation "IN THE MATTER OF European Patent No. 1 187 690" previously submitted as Exhibit A of the Response filed March 9, 2004 [see, page 5, line 20 through page 6, line 2].

Thus, in the PCT specification, Applicant teaches that the invention is a "cutter blade 8 according to Figure 1 is provided with a non-cutting blade edge 12 on the leading flat side 11 viewed in the direction of advance 9, at a right angle to the flat side 11." The wear -resistant feature, coating 15 on the leading flat face, is a preferred embodiment of the invention.

Thus, it is very clear that the same invention as published in the International application is disclosed to the USPTO. The invention described in the USPTO application does not contain a new thing. The US application is thus identical to the PCT publication. Thus, it is clear that the US sapecification contains a translation error, which is not due to Applicant. A translation error of the US application cannot contain a "new matter." Clearly, the translation of the international bureau of WIPO

and the translation of the United Kingdom contains the designation "non cutting edge."

The Present Invention

Before the present invention, high speed tools such as end mills required cutting edges diamond coating when used for abrasive materials such as graphite or sand, which do not form chips when machined. A tool with a cutting edge of diamond is very expensive. Thus, during the production of sand molds with a diamond cutting edge tool, the tool costs will be high. In the present invention, Hauschild et al suggest using a tool without diamond coated cutting edges. In fact, Hauschild suggests a tool without a cutting edge. With a tool without a cutting edge, a diamond coating is not necessary. The tool can be manufactured cheaply. The cost of the tool is small, although the wear is relatively high. Hauschild suggests a tool with a flat disk of high strength material for the non-cutting edge tool of the invention.

Typical prior atr tools are described by Kwasnick, "Diamond Tames Grapite's Bite," *CUTTING TOOL ENGINEERING Magazine,* April 1998/Volume 50/Number 3 (see Attachment 2). CVD diamond-coated endmills are discussed by Kwasniak, who states "[t]he endmill must have a combination of multiflute geometries and extreme wear resistance".

The machining of graphite also is expressly mentioned in the application of Hauschild, because the wear of tools working graphite is very similar to wear on sand molds. With respect to machining graphite electrodes, Kwasnick explains [page 3-Extreme Wear Resistance]:

> Tool life is an important issue. Graphite, as we all know, is abrasive. As soon as an endmill starts to cut into a block of graphite, tool wear begins. The amount of tool wear is directly related to the graphite grade, machining parameters, and to the cutting tool material.
>
> If the endmill immediately loses its cutting-edge sharpness (the actual feathered edge only), there is not a noticeable difference in machining. The endmill is now in a honed edge state caused by the abrasiveness of the graphite. If it continues cutting in a honed edge state, tool life will also continue.
>
> However, if the endmill experiences increased wear, a rapid decrease in tool life will also be experienced. The endmill's cutting edges are now dulled beyond that required to efficiently machine the material. This, in turn, causes a variety of tool pressure machining problems (i.e., part-finish loss, breakout, chipping, part-tolerance loss, etc.).
> All of these problems add up to remachining and/or scrapping of the [graphite] electrode. Either way, the CNC machining center must be stopped and the endmill changed. During this tool-change downtime mode, the tool must be replaced, touching off accomplished, and the previous cut picked up (for remachining) somewhere in the worn tool's cut path. Cutting [error] or recutting an area is certainly not adding to increasing graphite electrode production. Operator efficiency can also affect downtime.

The machining of sand molds with high speed cutting with a CNC machine exhibits the same problems. With sand molds, the wear is even greater. For the treatment of sand, the tool must exhibit extreme strength.

Prior to the present invention, tools with cutting edges were used to machine sand molds. To provide wear resistance such prior art tools with cutting edges were provided with a diamond coating or similar hard materialton the cutting edge. Such prior art CNC end mills for high speed cutting are illustrated in Attachment 3.

The presnt invention provides a simple tool for machining the sand molds that avoids the high cost tools having cutting edges coated with diamond. The tool is implemented as a flat sheet having any suitable thickness, preferably 0.3 to 3 mm,

more preferably 1 mm or less. Because it has no cutting edges, it cab easily stamped from metal sheet of roll stock. Thus, the cutting blade is a flat sheet without a cutting edge. The edge of the cutting blade is substantially a right angle, which is not a cutting edge.

ACTech, the assignee of the present invention has been using this technology for production of sand casting molds since summer 1999 with great commercial success. See Attchment 4.

The same sand mold and core prototyping procedure is described by the American Foundry Society, Inc. as follows:

> Machining a block of cured sand is a more delicate process than machining metal. Sand machining is a dry process without lubricant. When machining the sand blocks, a fluid diamond cutter passes more times across the block of sand to machine the shape of the mold and/or core. The sand block will chip, crack and/or fragment with any imperfection (inconsistency in curing).

See Attachment 5 - "Sand Mold & Core Prototyping" [http://www.moderncasting.com/archive/TechIn/TechIn_069_03.asp]. Note that this publication describes using a diamond cutter, whereas the present invention is used by ACTech, i.e., a flat cutter blade with no cutting edge.

Thus, the present invention of Hauschild provides a simple and economical tool.

Claims 12 and 22 are rejected under 35 U.S.C. §112, first paragraph. As discussed above, and confirmed with the translation of the International application from German [submitted March 9, 2004], which was provided for European Patent 1 187 690 granted on the corresponding application in the EPO, the original

specification teaches a "cutter blade 8 according to Figure 1 is provided with a non-cutting blade edge 12 on the leading flat side 11 viewed in the direction of advance 9, at a right angle to the flat side 11." A preferred cutting blade of the invention is "produced as a punched part by punching from a flat blank of sheet metal or wear-resistant sheet metal." It would be recognized by those skilled in the art that such production does not produce a "cutting edge." A "cutting edge" requires a "hook angle," which is the acute angle of the leading surface of the blade, or a "relief angle" which is an acute angle to the work surface, or both (see, e.g., "Exhibit B). In the cutting blade of the present invention the leading surface is a plane stamped from sheet metal; there is no acute angle of the leading surface; further, the end is substantially at right angle to the leading surface. Thus, the non-cutting blade egde of the present invention has neither the hook angle nor the relief angle.

Therefore, the amendment restores the claims and the specification to the orignal disclosure and meaning in the PCT International application, which designated the United States. The examiner must recognize the PCT published application. In accord with PCT **Rule 48.3** Languages of Publication (c) the translation of the summary into the English language takes place by the international authority of WIPO.

> c) If the international application is published in a language other than English, the international search report to the extent that it is published under Rule 48.2(a)(v), or the declaration referred to in Article 17(2)(a), the title of the invention, **the abstract** and any text matter pertaining to the figure or figures accompanying the abstract shall be published both in that language and in English. **The translations shall be prepared under the responsibility of the International Bureau.** [Emphasis added.]

The alleged "new matter" is completely contained in the publication by WIPO of

PCT International application designating the United States, as is demonstrated by the Abstract. Thus, it is incorrect to exclude this evidence. Clearly, the translation of the international bureau of WIPO and the translation of the United Kingdom (previously submitted) contains the designation "non cutting edge."

All the evidence of record supports Applicant's position that the amendment to the claims regarding "non-cutting edge" does not introduce new matter. It is respectfully submitted that the examiner has no legitimate basis for this new matter rejection and this rejection should be withdrawn.

Claims 11-30 are rejected under 35 U.S.C. §112, second paragraph. The examiner alleges that, although the term "cutter blade" is used by the claim to mean a tool without cutting edges, the accepted meaning clearly involves a tool with cutting edges. Applicants strongly disagree.

Indeed, Applicants do not understand the basis for the examiner's position. Apparently, the examiner does not understand that the cutting tool does not exhibit a cutting edge when the edge has an angle nof 90°. The USPTO examiner thereby is the only examiner that complains of the gist of the invention. This objection did not arise with the German patent office in Munich or with the international authority at WIPO or with the EPO.

Applicants pointed to U.S. Patent 4,205,799 of Brewer (a copy of which was submitted on March 9, 2004 as Exhibit C), which illustrated a perspective view of a cutter blade is shown in FIG. 6 as follows:

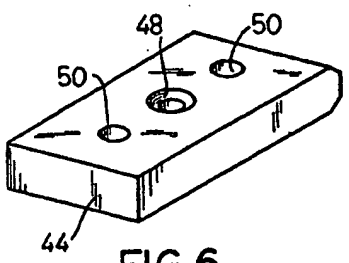

FIG. 6

As further illustrated, for example, in FIG. 8, the working face of this cutter blade is side 44.

The examiner states that "Brewer is largely non analogous to the instant invention." Applicants strongly disagree. This opinion of the examiner is absolutely wrong.

US 4205799 of Brewer is describes a "shredding apparatus with **cutter blades**." In this regard, the **cutter blades 44**, as seen in FIG. 6, are provided with a central opening 48 which is countersunk on both sides of the **cutter blade 44** and a pair of open ended holes 50. The cutter **blades 44**, as seen in FIG. 6 are without **cutting edges.**

Brewer is calssified in the IPC in the class B02C 13 - Disintegrating by mills having rotary beater elements. "Beater elements" for firm materials do not have a "cutter blade" with a cutting edge.

See also:

US 4848682, SCHELER MORRIS (Attachment 6)

This invention relates to an apparatus for the crushing of solid materials

such as rock or stone. In particular, **this invention relates to rock and stone crushers which use two sets of cutting blades**.

US 3695722, FAIRWEATHER ERNEST SIDNEY (Attachment 7)

This invention relates to apparatus for treating or digging into material, for example for cutting grooves in bricks or the like and cutting members for this apparatus. It is already known to provide a hard metal tipped cutting or impacting hammers which have a number of annular ring-shaped cutting abrasive wheels.

US4915309 SCHMIDT HORST H (DE) (Attachment 8)

The invention relates to a rotor for a rebound or impact crusher, comprising a number of discs disposed axially spaced out on a shaft, and **beater blades** which are disposed in marginal recesses in the discs.

Each of these patents describe cutter blades without cutting edges.

On the other hand consider **US 3642214 (Attachment 9)**, which is directed to a cutter tooth assembly for a rotor of a grinding machine of the type used for grinding wood, paper, paperboard and the various types of debris carried by these substances. An object of this invention is to provide a cutting blade for a cutter tooth assembly that is inexpensive, shaped with a **cutting edge** that withstands high compressive impact forces and substantially retains its shape after prolonged wear [col. 1, lines 68-71]. The acute angles of the cutting edge geometry are described at col. 3, lines 9-22.

Thus, clearly in the field of processing of solid materials the term "**cutter blade**" is certainly used in the same way as in the present invention. The term "cutter blade" that does not have a "cutting edge" is present in the prior art. Also, a "milling cutter" for stones and abrasive materials posesses a cutting blade with a right angled cutting edge. For this reason, the suitable term can be "cutting blade" or "cutting hammer." In contrast to this is the cutter for soft wood, which uses the term "cutting edge."

In the invention of Hauschild, the designation "cutting edges" is not used. The terms "cutting blade," "blade edges" and "non-cutting edges" are used by Hauschild.

The present invention and the spirit of the present invention, thus, lie nearer to Brewer US4205799. The invention of Hauschild is aimed at machining of a sand mold. Working on a sand mold is more similar to the working on stone. Working on sand is not similar to the machining of metal or wood. Thus, the spirit of the invention is nearer to Brewer than to Williams or Schweikert.

The tool of the present invention includes a flat blade that is rotated. The examiner admits that it is driven in a transverse direction to the axis of rotation that is known to perform a cutting action [page 4, item 5]. The fact that the "cutting blade" does not have "cutting edges" does not render the claim indefinite and unclear. The abrasive material still is cut by the blade of the invention. However, because there are no cutting edges, there are no cutting edges to dull quickly or to be coated with a very hard material like diamond to increase wear.

The fact that the cutting blade is for machining chipless materials is important to the tool structure of the invention. The tool of the present invention is useless for metal or wood which produce chips by the flutes of the standard tool having cutting edges. However, such tools are not suitable for abrasive, chipless materials like sand and graphite, unless coated with diamond which is expensive. The present invention provides a cheap, simple cutter blade without cutting edges that is suitable for abrasive materials, particularly sand molds.

The specification clearly defines a milling tool having a cutting blade provided with a non-cutting edge. Applicant respectfully submits that this terminology is not indefinite and would be understood by those skilled in this art. Because the claimed invention is used in making sand molds, those skilled in the art would understand that the non-cutting edges of the milling tool will provide for removal of the sand mold material in a chipless manner. To the contrary, a tool with a cutting edge would cause chips (or larger portions) of the molded sand and wear quickly, causing damage to fine mold contours.

In making foundry sand casting molds, it is important for the removed material to be powdery, and not form splinters or chips, in order to avoid degradation of fine details in the mold surface. For this reason, the shank end tool in accord with the present invention must not have a cutting edge. Further the shank end tool should exhibit a small weight in comparison to the shank so that no vibrations develop. Thus, the shank end tool of the present invention has a thickness less about 5 mm or less. None of the cited art suggest such a shank end tool as taught and claimed in the present application.

Foundry sand casting molds are made from a block of san bonded together with a synthetic resin. This is the same type of material of which grinding wheels are made. It can be readily appreciated that a cutting tool having a traditional wedge shaped cutting edge is not suitable for cutting a grinding wheel; thus, it can be appreciated that tools with cutting edges also are not suitable for machining foundry sand casting molds. Thus, the present invention provides a shank end tool without

cutting edges in order to mill the foundry sand casting molds. None of the cited art suggest such a shank end tool.

Therefore, contrary to the Examiner's assertion, it **is accepted** that a cutter blade is **not** required to have a "cutting edge."

It is respectfully submitted that the claims particularly point out and distinctly claim that which applicant regards as invention. Withdrawal of this ground for rejection is requested.

Claims 11-15, 18, 21-25 and 28 are rejected under 35 U.S.C §103(a) over Williams (U.S. 2,621,548). Williams is directed to a mounting for cutting tools, "particularly cutting tools of the rotating type, such as drills, countersinks, counterbores, and the like, which are commonly employed for the performance of various cutting operations" [col. 1, lines 2-5]. Although the cutting inserts are not illustrated in great detail, **because the invention is to the mounting**, nevertheless, the description clearly states that the insert tool 4 is composed of high speed tool steel and "is provided with ***cutting edges 5 disposed at an angle to each other so that the tool 4 will serve as a drill when rotatably driven***." [Col. 2, lines 44-53; emphasis added.] Thus, the insert of Williams cannot merely be stamped from a sheet of steel. Instead, a cutting edge 5 must be ground onto the insert at an angle to provide the cutting. The Williams tools are [col. 1, lines 30-33):

> initially in the form of identical blanks, ***prior to*** the provision of such blanks with various types of ***cutting edges***. [Emphasis added.]

Williams object is to make cutting tools for a small machine shop for the

performance of various cutting operations by drills, countersinks, counterbores, and the like. There is absolutely no hint of a suggestion in Williams to make a tool without cutting edges.

In the present invention, the blade ***does not have cutting edges*** and would not serve as drill when rotatably driven. Instead the edge of the blade of the present invention is at right angle to the blade major surface.

Thus, the teaching of Williams is contrary to the present invention which requires non-cutting edges, i.e., edges substantially at right angle to the blade major surface. The edges of the tool of the present invention merely knock particles of molded sand away from the mold to provide a desired surface contour in a chipless manner. This permits the advantages described in the present specification.

Although Williams describes a cutter blade made of a flat bar, it additionally is provided with cutting edges. For example, as best shown in Figs. 6 and 10, each form of shank I or 1a provides **chip** removing grooves 13 starting on opposite sides of the insert tool 4 or 13 and extending spirally around the outside of the shank.

To the contrary, the present invention provides a shank tool without a cutting edge, so that during the high-speed treatment of foundry sand casting molds no chips can develop. The sand waste when milling must be removed by vacuum.

Because Williams fails to teach or suggest the presently claimed shank end tool without cutting edges, Williams also fails to teach or suggest the claimed methods.

The examiner asserts that Applicant has provided no basis for why this particularly wide range of thickness is crucial to the workability of the device. However, as explained above, the present invention can accommodate any suitable thickness. A primary feature of the present invention is the lack of a cutting edge. Williams fails to teach or suggest the lack of a cutting edge.

Thus, it is not seen how the present invention would have been obvious to one of ordinary skill in the art in view of Williams. Williams fails to mention or recognize the problems of machining sand molds. One of ordinary skill in the art would have no reason to remove the cutting edges from the Williams tools (i.e., in other words, no reason to make cutting blades without the cutting edges taught by Williams).

Claims 16 and 26 are rejected under 35 U.S.C §103(a) over Williams in view of Schweikert et al. (U.S. 5,222,842). Williams is discussed in detail above. Schweikert **fails** to make up for any of the deficiencies in Williams. Claims 16 and 26 still require a shank end tool without a cutting edge. The Examiner cites Schweikert for a teaching of a cutter blade having a convex face. However, Schweikert clearly teaches tools having cutting edges. See, particularly, FIGs. 5 and 6 showing cutting edges 26, 30 (FIG. 5) and 36, 40 (FIG. 6). There is not even a hint of a suggestion in Schweikert for a shank end tool without a cutting edge.

Thus, it is not seen how the presently claimed shank end tool with non-cutting edge would have been obvious to one of ordinary skill in the art from any combination of Williams and Schweikert.

Claims 17 and 27 are rejected under 35 U.S.C §103(a) over Williams in view of Ogawa (U.S. 5,597,269). Williams is discussed in detail above. Ogawa **fails** to make up for any of the deficiencies in Williams. Claims 17 and 27 still require a shank end tool without a cutting edge. The Examiner cites Ogawa for a teaching of a blade that includes a shovel-like arrangement with blades that are sloped with an angle relative to the longitudinal axis to produce a fan-like action. However, Ogawa, clearly teaches tools having cutting edges. See, particularly, FIG. 1, cutting edge 4 with a lip angle "α" and a rake (or hook) angle "θ." At col. 2, lines 10-13, Ogawa states:

> [a]ccording to the present invention, the cutting tool has a plurality of spiral blades and each of the blades has a **keen cutting edge** with an **extremely acute angle** which comprises a radial edge portion and a bottom edge portion.

[Emphasis added.] There is not even a hint of a suggestion in Ogawa for a shank end tool without a cutting edge. Indeed, the lip angle is preferably an extremely acute angle, specifically 1 to 20 degrees (col. 2, line 66 - col. 3, line 1). Thus, Ogawa describes a razor-like blade, which is totally unsuitable for milling a sand mold.

The US examiner states that Ogawa has a "fanlike" effect. Applicant requests from where does the examiner knows this, because the term "fan" or "fanlike" is missing in Ogawa. Applicant respectfully submits that the tool of Ogawa is spiral.

Thus, it is not seen how the presently claimed shank end tool with non-cutting edge would have been obvious to one of ordinary skill in the art from any combination of Williams and Ogawa.

Claims 20 and 30 are rejected under 35 U.S.C §103(a) over Williams in view of Freitag (U.S. 3,540,315). Williams is discussed in detail above. Freitag **fails** to make up for any of the deficiencies in Williams. Claims 20 and 30 still require a shank end tool without a cutting edge. The Examiner cites Freitag for a teaching of a cutter with a hollow cylindrical shank for cutting through Styrofoam.. However, Freitag, clearly teaches tools having cutting edges. See, for example, cutting edge 42 (FIG. 3) and 70 (FIG. 7). There is not even a hint of a suggestion in Freitag for a shank end tool without a cutting edge.

Thus, it is not seen how the presently claimed shank end tool with non-cutting edge would have been obvious to one of ordinary skill in the art from any combination of Williams and Freitag.

None of the prior art teach shank end tool that can provide machining of foundry sand casting mold materials **without chip production**, for the manufacture of heat-resistant casting moulds, **in particular of sand mould containing binding agents** for the manufacture of casting moulds made of metal. Nor does the cited art provide a cutting blade that can be a stamped part from a flat cut piece of steel, wear-resistant steel, or a suitable wear-resistant material produced by stamping, and with an outer blade surface (thickness end) standing at right angles to the flat major side and ready for use. Nor is there any suggestion that such a cutting blade without cutting edges be used to machine sand molds.

Since summer 1999, ACTech have used this invention (application priority date of June 24, 1999) for DIRECT MOLD MILLING (DMM) of the molding material as a new

Rapid Prototyping mold making technology in addition to known Direct Croning® techniques. This procedure is able to generate mold segments with sizes much bigger than the known building dimensions of laser sintering equipment. At present, ACTech use equipment for mold segments up to an external dimension of **2.5 m**. As an example of use of this new technology, the manufacture of large-surface car body structures that are produced as die casting parts in later series production or as pre-casted patterns accurate in size and this technology is able to reduce the milling time for dies to a fraction.

In this procedure, it is not necessary to produce a pattern equipment which is consuming a lot of costs and time. The mold is directly milled into a block of molding material. The size of the applied mold is only limited by the mechanical strength of the molding material used and the available milling equipment. The five-axis CNC-milling machine used at ACTech allows dimensions up to 2.400 x 1.400 x 800 mm for a single mould segment. However, by dismantling of the needed mould in segments also larger moulds can be set up.

It is respectfully submitted that the subject application is in a condition for allowance. Early and favorable action is requested. If any issues remain after consideration of this response, the Examiner is requested to call applicant's attorney to attempt to resolve those issues expeditiously.

Applicant has the sense from the examiner's statements that the examiner does not understand the present invention and does not understand the difference between cutting tools having cutting edges and those without cutting edges. Some of the

statements do not appear to be based on scientific principles. Therefore, if after consideration of the above discussion, issues still remain, Applicant reuests that the examiner call Applicant's attorney to discuss the remaining issues so that the examination can proceed as expeditiously and economically as possible.

If for any reason a fee is required, a fee paid is inadequate or credit is owed for any excess fee paid, the Commissioner is hereby authorized and requested to charge Deposit Account No. **04-1105**.

Respectfully submitted,

Date: August 2, 2004

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